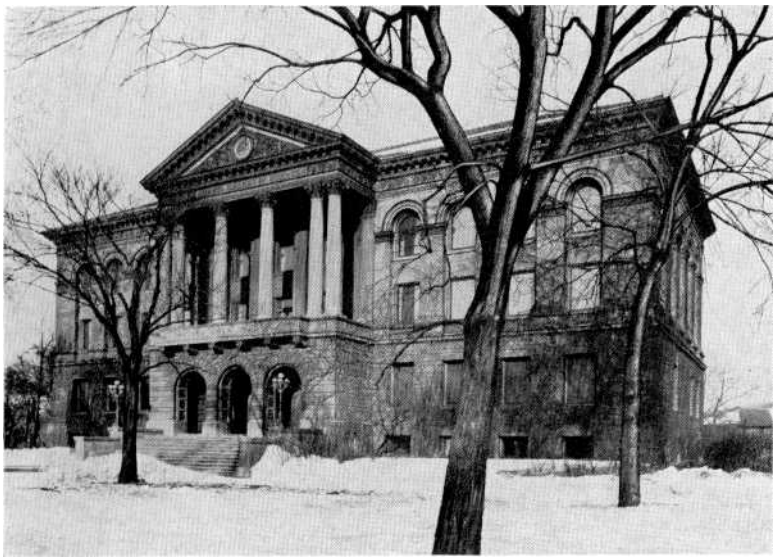
The CHICAGO NATURALIST

Published by

THE CHICAGO ACADEMY OF SCIENCES

VOL. 4 • NO. 4 DECEMBER • 1941



The Chicago Academy of Sciences

Lincoln Park · Clark Street and Ogden Avenue

The Chicago Naturalist

Published four times a year by
THE CHICAGO ACADEMY OF SCIENCES

VOLUME 4 | DECEMBER, 1941 | NUMBER 4

Table of Contents

Museums in the Emergency

During the last few years Museums have been criticized as old-fashioned, out-of-date, lacking in verve and splash and modernity. The critics have called many of the exhibition methods stuffy and conventional and have lamented the slow and careful pace to which Museum staffs have held in the modernization of exhibits. The high-pressure salesmanship of modern advertising has been recommended to us. We have been urged to think more of influencing the masses of our visitors and less of fidelity to our materials.

And in the midst of this, we find ourselves as a country in an emergency, when it is necessary to think about problems of morale and national enthusiasm. Those who seek to find among the American people the enthusiasm for national ends which is so essential, find that again and again they are faced with cynicism and apathy, in people who feel they have been over-propagandized, oversold. The tricks of the propagandist have been labeled and displayed, the machinations of the advertiser are known to everyone, the public is dishearteningly canny, suspicious of every means of communication open to those who would fire the imagination of the people with the importance of the present hour. Dishearteningly suspicious they are—except of Museums. The Museums, almost alone among the various means of communication that have been exploited to push and prod people about, to make them feel, or want, or buy, have remained uncontaminated. Because the staffs of Museums have insisted on saying: "Is this true?" instead of asking: "Will this make a hit?"—they have kept the people's trust.

Those who enter the doors of our Museums do so in a faith that they will not be tricked or deceived, that no one will seek by high-powered lighting arrangements to make the facts of science other than they are. They go out from the doors of the Museum believing in one of the foundations of democracy—that it is possible for an individual, by slow, honest, exact study to find out more about man and the world in which he lives. For an hour or so they have been able to trust their eyes and let their minds rove over materials which have not been arranged to impress, to convert, to push them around, but merely to tell them as much of the truth as is now known, and that quietly.

So at this moment, when America needs the strong deep enthusiasm of every citizen for the democratic way of life, the Museum which has refused to give up its faith in the materials of science, the Museum which has scorned to substitute emotional appeals for orderly demonstration, finds itself with a definite place in the national program. As a place that the people trust, it is now a place in which they can renew their trust in science and in democracy.

Margaret Mead
Assistant Curator of Ethnology
The American Museum of Natural History

Reprinted from **Natural History Magazine,** September, 1941.

The Museums of Britain and the War

A. TINDELL HOPWOOD, D.Sc., F.L.S.

BRITISH MUSEUM (NATURAL HISTORY), LONDON

The outbreak of war in September 1939 did not find the museums of Britain unprepared; for twelve months previously museum curators had been quietly but steadily making arrangements to safeguard the collections committed to their care. How they went to work, and how far the war has interrupted their normal duties of conservation, instruction, and research, it is the purpose of this article to describe. Additional details may be gleaned from the files of *The Musems Journal,* from Vol. 39, No. 7, October 1939, up to date.

International politics in Europe reached a crisis in September 1938, when the threat of war was very near; consequently we in the British Museum started to carry out arrangements which had begun to take shape even earlier. Curators are at all times jealous for the safety of their collections, and the progressive deterioration in European affairs made it inevitable that when the crisis came plans should be in existence to meet it. That same spirit of foresight necessitated a continuance of this policy when the crisis was overpast, for few could believe that the respite was other than temporary.

The most valuable specimens were dealt with first; they included such things as a mounted quagga, *Archaeopterya,* certain birds which have become extinct during the last few centuries, and the fossil human skulls of Piltdown, Swanscombe, and Rhodesia. These were withdrawn from exhibition—the fossils were replaced by casts—packed in cases and taken to the basement to await removal to the country. (The first boxes of birds were sent off in April 1939).

Removed to the Country

Before this work was finished the responsible officers throughout the Museum were preparing lists, not only of type and figured specimens, but also of other specimens and even of entire collections which we could not afford to lose. The nature of the list varied according to the kind of material and its quantity, especially the latter. One gives the name and register number of each specimen, the number of the case or drawer from which it was taken, the number of the chest in which it is packed, and code letters indicate if it is a type or figured specimen, as well as the place of storage; another list may only say that the "Blank Collection" is now at "Bumbleton." Each person had to decide how best to deal with his material. As the chests were packed they were removed in batches to previously selected storage places in

the country; the number of containers in a batch depended on their size, weight, and the available transport.

As with the collections, so with the libraries; they too have been removed to a safer place. A few texts and periodicals of less importance, together with the last one or two volumes of periodicals in progress, are all that remain in London.

Naturally, this dispersal has curtailed severely the activities of the Museum, but the policy has been amply justified by the results. Early in September 1940 the roof of the Herbarium was set on fire by an oil incendiary bomb and extensively damaged; the fire also damaged that part of the collections which had been left in the gallery. Two nights later a medium sized bomb fell at the back of the building; the blast rendered two ranges of studies uninhabitable, broke much glass in the galleries and blew out all the windows along one side of the adjacent Science Museum. In October the roof of the Shell Gallery was burnt off. A second raider saw the fire and neatly dropped a small bomb on it; fortunately without causing serious damage or casualties. In November a bomb fell in an inside area and blew out more glass. Minor damage has since been caused by other bombs which did not fall so close to the building.

Collections Which Have Been Lost

Whereas some museums have had better luck, there are others, fortunately not many, which have suffered very severely. The Natural History Departments of the Bristol Museum were badly damaged in November 1940; here the entire Geological Department, most of the Botanical Department, and much of the Zoological Department were destroyed, but even in the Geological Department prior removal of types and other material has meant that a nucleus exists around which fresh collections can be built. The Liverpool Museum has been completely destroyed. except for those portions of the collections which had been removed and some material of secondary importance in the galleries of Shipping and British Zoology. The Musem of the Royal College of Surgeons of London was almost entirely destroyed. With it perished material made famous by the writings of Clift, Owen, Darwin and Flower, as well as the unique collections of human osteological materials. Very severe and extensive damage has also been done to the museums, art galleries and libraries in Glasgow, Plymouth, Birmingham, Hull, Coventry and Southampton, but in almost every instance the staff report with pride that their best material is safe; it had been sent away in time.

Re-opening After a Blitz

All this bears on the current life of the museums and on their relation to the public, but there is something else to keep in mind, namely

this. The museum staffs have no special privileges, neither do they wish for any. If they be not too old the men are liable for military service, and both men and women may be called on to do some form of war work; hence there is also a considerable shortage of staff. Despite this the public galleries, or at least part of them, are kept open whenever possible. Should accidents happen and the museum have to close for a while every nerve is strained to reopen part of it as soon as possible. What this means cannot be told except by those who have had to do it, and they are the last to say anything about it, but the fact that 70 tons of broken glass were removed from the Bristol Museum in the course of cleaning up for the reopening in February, 1941—only two and a half months after the bombs fell—is an indication.

Immediately after a fire or explosion everyone turns to and does what he can. Some of the staff are on duty throughout the twenty-four hours, and they work in small parties under the instructions of the man whose previous training and experience best fit him for the particular job in hand. The rough work done, and the damage surveyed, attention is then given to the problem of making the best of what remains. This is necessarily an improvisation, but the attractiveness of the exhibits, their general interest and their bearing on events of cultural or national importance testify to the buoyancy of spirits of the staffs. The public, too, play their part; there is no falling off of interest.

Even when it has been necessary to close there are always some would-be visitors, and there is still a constant, if slightly lessened, stream of enquiries by post, as well as numerous sales of publications. But, and this is significant, most of the interest now displayed has an economic bearing. The times are too grim for hobbies, but they arouse curiosity concerning rats, cockroaches, lice and fleas. The museums and the public still need each other, and those who foretold a cessation of public interest in time of war have proved to be false prophets indeed.

Planning for the Future

Where the doors have been shut the ever-present stimulus of contact with the public is lacking, but another takes its place. There are many museums up and down the country where the staffs are reflecting on the opportunities given to them through enemy action, and are working out improved exhibition methods, writing better labels and drafting new guide-books in readiness for the day when their museums shall once more play their part in the life of the community.

(Continued on page 127)

On Postage Stamps Is Pictured The
Romantic Story of Food Products
Brought to Your Neighborhood Store—

From the Ends of the Earth

RAYMOND E. JANSSEN
Photographic reproductions by the author

Upon the shelves of your neighborhood grocery store are rice, tea and spices from the Orient; coffee, cocoa, tapioca, and bananas from South America; pineapple, coconut and sago from Pacific isles; olive oil from the Mediterranean; codfish and herring from Newfoundland or Scandinavian countries. Many food products such as these are not produced in the United States (or at least not in sufficient quantities to meet demands) so that your dealer must bring them here from across the seas. At the moment that you read this, a fruit ship loaded with bananas may be plying through the Caribbean on its way to New Orleans, a second may have just passed through the British blockade at Gibraltar with its load of olive oil, or a third may be tied up at the docks of Singapore while dusky natives fill its hold with tea and rice destined for the shelves of your neighborhood store. The trade routes of the world are occupied every day with commerce such as this, giving employment to millions of people, and bringing you products that could not be obtained in any other way.

And while all this is taking place, a letter bearing the invoice for a shipment of these goods may be passing through the U. S. Post Office. On the envelope may be a postage stamp showing the picture of a native harvesting rice in far off China. "Why," might you ask, "does a stamp from China picture the harvesting of rice, or why does one from Costa Rica show a donkey plodding along under a heavy load of bananas?" Simply this: stamps carried on letters to all parts of the world provide one of the simplest and most effective means of disseminating information about their home countries—each little stamp is an individual messenger telling a subtle account about the place from which it comes. For example, Newfoundland wants to sell its codfish which constitutes its principal industry; hence the country pictures the codfish on its postage stamps, thereby advertising the fact—without cost—in every region where mail is carried. Upon food industries such as these are dependent the economic and political structures of many nations, and upon the stamps of these countries are pictured many of the products which ultimately reach the shelves of your favorite store.

1. South American fruit boat. 2. Picking tea leaves. 3. Tapping and boiling chicle. 4. Preparing cassava tubers for tapioca. 5. Coffee branches. 6. Olive tree with roots in Balkan capitals. 7. Donkey transporting bananas.

On these shelves is found a product that is more widely advertised by postage stamps than any other single item. It is coconut which, as we all know, is the fruit of a variety of palm tree. Palm trees suggest thoughts of warm, tropical isles where mellow moonbeams dance across the glistening waves, of lands inhabited by swarthy half-civilized natives, of regions blessed by continuous peace, happiness and contentment. Even in our own country the palm-fringed regions are looked upon as places of comparative ease and quiet where one may retreat from the icy blasts of northern winters and loll beneath sunny, cloudless skies. Like a gigantic belt, encircling the middle of the earth, is this wide expanse of tropic mystery, dominated by the swaying palm tree. And because the palm is the most widely distributed of all trees, the life-blood of more countries is dependent upon it than on any other such resource. For this reason, too, the coconut palm has been pictured on the stamps of no less than twenty-five tropical nations. Most of them are island countries between whose shores ply the countless steamers engaged in that picturesque trade known as the copra industry. Copra, the dried meat of the coconut, is the source of the packaged shredded coconut sold in all our food stores. Even the outer husk of the nut has its value, for the coarse fibers are made into household brushes, rope and door mats. As a result, the all-important coconut palm may be seen on the stamps of many South Sea countries.

1. Northern logging camp. 2. Tuna fish. 3. Herring. 4. Pod of cacao tree. 5. Orchid blossoms. 6. Grove of coconut trees. 7. Codfish. 8. Picking coffee.

While perspiring islanders load copra into the holds of vessels docked in far-off climes, other natives—half-Indian and half-Spanish perhaps—are occupied in a somewhat similar task along tropical American shores. Not copra, however, but cacao, is the product which engages their attention. For just as the coconut palm provides the leading industry for many a nation, so does the cacao tree occupy a vital position in the commerce of others. From the pod of the cacao is made sweet chocolate and delicious cocoa. The latter name is really an English corruption of *cacao,* the scientific name of the tree from which it comes. Ecuador, Venezuela, and Costa Rica are the largest producers of cacao, and they have not been slow to see the advantage of picturing this highly demanded product upon their stamps. Each has issued adhesives showing the cacao pod.

Shrouded in oriental mystery are the romantic histories of two other very common beverages—coffee and tea. The tracing of their origins has occupied the researches of numerous scholars, and the resulting stories have occupied many volumes. The wild coffee tree is of Ethiopian origin, but it seems to have been cultivated first in Arabia as early as the fifteenth century. Its use was quickly adopted by the Mohammedans, and by the middle of the century coffee houses

were established in most Arabian towns. These coffee houses became popular loafing places where the townsmen could gossip and converse amongst themselves or with officials, seamen, and traders. Because of its quality of stimulating wakefulness, coffee was appreciated by the religious devotees of Mohammed in their prolonged religious ceremonies. However, its use was condemned by the priests who considered coffee to be an intoxicant and, therefore, contrary to the teachings of the Koran. By the beginning of the sixteenth century civil authorities were prevailed upon to condemn coffee houses, whereupon most of them were destroyed or put out of business. By 1633 the use of coffee throughout the Ottoman Empire was forbidden under penalty of death. Its popularity survived, however, and thirty years later coffee houses were again permitted to operate, but this time under governmental license.

The coffee houses spread throughout Europe and into England where they soon became centers of the intellectual life. Each profession or rank of society had its own coffee house headquarters, and from the informal meetings which took place under these roofs sprang numerous clubs and institutions. Foremost among these were the Royal Society and Lloyd's of London. Lloyd's coffee house, for traders and mariners, was a place where bulletins were posted for the benefit of sea-faring customers. Here, men engaged in maritime pursuits would meet and discuss their common problems. Out of such humble beginnings as this grew the great insurance association which is still an important concern in world trade.

The coffee trade itself became centered about Mocha, and until late in the nineteenth century Arabia furnished nearly all of the world's supply. Its production spread into India, Ceylon, Java, and eventually to Central and South America which are now the largest producers. Branches of the coffee tree are pictured on stamps of Haiti, and a scene of natives picking coffee berries is found on a stamp from Colombia.

Tea, which seems to have originated in India, was later introduced into China and Japan, and finally into the western world. It is, in reality, not a tree, but a small evergreen shrub growing only from three to five feet high. In contrast to coffee, the leaves rather than the seed are used in making the beverage. Tea still comes to us from the orient, and it is on a stamp from Ceylon that we see the picture of a native picking tea leaves.

Have you ever wondered about the source of tapioca, used now and then in nearly every household? The little starchy pellets are made

from the tuberous roots of the cassava plant which also grows in tropical countries. The plant itself seldom grows higher than a man, but its bulky roots are often as much as three feet long and six inches in diameter! The initial stage in preparing cassava for market consists of grinding the roots. Native hand labor is used largely for this purpose. Native women, seated upon the floors of their thatch-roofed huts, grind the cassava roots in vessels held between their outstretched legs. In Jamaica this operation is of sufficient commercial importance to have prompted its depiction on a postage stamp.

Ordinary vanilla flavoring extract has, perhaps, the most romantic source of our foreign food products, for it is obtained from orchids—and who does not thrill at the sight of a magnificent orchid? The extract is produced from the fermented pods of several kinds of these exquisite flowers. The pods are two or three times as long as ordinary pea pods, and half an inch in diameter. Tiny, hair-like vessels on the interior of the pods secrete the liquid which becomes the commercial vanilla extract. Our principal supply comes from Central American countries, and one of these—Costa Rica—has chosen to picture an orchid blossom on one of its stamps. Synthetic vanilla, made by chemical means, has been used largely in Germany and, no doubt, is now being used there exclusively as a result of the Allied blockade on imports.

Rice—for thousands of years the staff of life for most oriental peoples—still occupies the lanes of many trade routes. Although much of it is now grown in Louisiana and Texas, vast amounts still come to us from Asiatic regions. Like wheat, oats or barley, it is a cereal belonging to the grass family. The domesticated variety is believed to have originated from a wild plant native to India and Australia. Our imports of this stable commodity come largely from India, Indo-China, and the Malay states, although some also comes from our own Philippine Islands. The Malay state of Kedah has issued a stamp showing a sheaf of rice, and on a stamp from China we may see a view of a native harvesting rice by hand labor.

Not only economically, but politically as well, the olive has become a symbol of national importance in many Mediterranean countries. Here the oil from the olive soothes not the troubled waters of diplomatic intrigue, but instead—because of its commercial importance—has become an emblem of nationalism. In verification of this fact, we find that as long ago as 1931 Turkey issued a postage stamp depicting an olive tree with its roots extending into all the Balkan capitals, significant of Turkish influence in the Balkans.

Numerous kinds of fish, important in the industrial life of various countries, have also been advertised on stamps. Newfoundland has chosen to picture the codfish, referring to it as "Newfoundland currency." Since the codfish industry leads all other enterprises there, economic stability is dependent upon the status of the codfish market; hence its reference to currency on the stamps. Iceland, too, is vitally interested in fisheries, and it has pictured the herring on its stamps. Herring are caught in great numbers in the North Atlantic from Cape Cod to Scandinavia. Most of the herring are salted or pickled for

1. Harvesting rice. 2. Sheaf of rice. 3. Sago palm. 4. Drooping bunch of bananas.

export, but more familiar to many of us perhaps, are the small, canned varieties called sardines. Inhabiting waters of the more southern Atlantic is the tuna, one of the largest of food fishes, attaining lengths of fifteen feet and weighing 1500 pounds. The tuna is shown on a triangular stamp of Costa Rica.

Perhaps you are not aware that the bananas which are brought to your local grocery store may really have started their journey on the back of a little donkey somewhere in tropical America. But if you look at a stamp recently issued also by Costa Rica, it is easy to see that this may certainly be the case. There the bananas are grown on

huge plantations, and after being cut, the bunches are carried by this primitive means to distributing points for loading on the ships which transport them to the United States. Contrary to popular opinion, the banana does not grow on a tree, but on a giant herbaceous plant. The plant produces a single cluster of flowers and fruit at its tip. At first, the cluster is supported in an upright position by the rigid stem; but as the fruit grows in size, the increasing weight causes the cluster to droop as though it were suspended. An airmail stamp from Colombia depicts such a drooping bunch of bananas. And on a stamp from Ecuador may be seen one of the big express boats which transport bananas and other tropical fruits to distant markets.

Perhaps you may want to top off your day's purchases with a package of chewing gum, and this too, originates in tropical America. Chewing gum is made from the commercial product called chicle, obtained from the milky juice, or latex, of the sapodilla tree. This latex is collected by tapping the tree trunks. The raw fluid is cooked down in large kettles, after which the resulting rubbery mass is moulded into large blocks for export. From this are made the familiar sticks of chewing gum after its arrival in this country. British Honduras is a leading producer of chicle, and it is on a stamp from this country that we see a picture of natives tapping a tree and boiling the latex.

Having made your purchases at your neighborhood grocery store, you may carry them home or have them delivered in paper sacks made from wood pulp grown in northern regions. Most of our paper supply has been coming from Canada, Newfoundland, and the Scandinavian countries. With the spread of the war into Scandinavia, the North American countries now have virtually a monopoly of our pulp paper imports. In such regions of extensive forest growth, logging operations are a leading industry. After being cut, the trees are trimmed in local logging camps. The logs are then usually floated down the rivers to the great paper mills. Such a logging camp is shown on a stamp from Newfoundland.

Adhesive postage stamps have been in use just a hundred years, the very first one having been placed in use by Great Britain on May 6, 1840. Today no country is without them. The first stamp designs portrayed rulers, statesmen and coats-of-arms, but in recent years the nations have learned to put them to more practical uses. Hence the modern practice of portraying products which constitute the life blood of these various nations. Every day, countless thousands of these little scraps of colored paper cross and recross each other's paths, carrying their silent, yet potent, messages to all corners of the earth.

Geology and Man

JOHN R. BALL*

The title of this article betokens more interest, possibly, in the well-being of the science than in the attempt to interpret the nature and scope of Geology. However, a modest but sincere effort will be made to accomplish something of that mission as well. Geology is a term somewhat foreign to man's everyday vocabulary. The word carries a sound similar to that of geometry or geodesy, terms suggestive of mental abstraction for which a busy man has but little time. The geologist is first to learn that John Doe does not follow with ease an off-hand statement of the geologist's business. In attempting to return a civil answer to a natural inquiry concerning his business amidst the rocks, he encounters a common and oft-seen reaction. He watches a bewildered look pass across the face and listens to a feeble witticism about the prospects for "finding gold." Generally the next event is the departure of the questioner, obviously in greater relief than the geologist even feels in being left alone to continue his study.

Howbeit, as geodesy serves to remind one of man's activities in determining the form of the earth, so Geology presents some of the results of man's reasoned thinking about the same subject. Geology is unique in that much of its foundation was built by non-geologists. Some of its fundamental principles first were jotted down in the journal of an observant traveler. From abbreviated items of this sort the bulk of the earlier geological literature took form.

Most other scientists, if in the mood, may claim with much propriety that earth phenomena, or phenomena rooted in the earth, have large place in their science also. This is so truistic that no one need entertain any fear of loss. Probably it is largely fortuitous etymology which permits geologists to keep well to the fore the claim that their science is solely of the earth.

Viewed optimistically, the mass contribution of science seems to be directed immediately for the good of humanity. One has to be momentarily forgetful of war. But in another sense, the trend of things seems to be leading Geology, at least, towards imminent oblivion as far as popular interest is concerned. Five years ago the writer had occasion to review casually the preponderance of subject matter appearing in several scientific publications. Periodicals were chosen chiefly from among those which present science in popularized form. Strictly technical magazines were not chosen. No attempt of a highly

*Associate Professor of Geology and Paleontology, Northwestern University, and Honorary Curator of Geology and Paleontology, Chicago Academy of Sciences.

exhaustive or comprehensive survey was made. Thus surveyed, the articles counted fell into the following alignment: Biology 30; Applied Science 27; Chemistry 19; Medicine 17; Transportation 16; and Radio 14. Geology, sharing pages with six other miscellaneous interests, obtained credit for *two* articles!

Recently, another survey of the same nature has been made. The same publications and the same general subjects have been checked. A slight modification was added, however, in the survey of the index of one of the monthly publications including the titles for the last half of 1941. Lumped together, the articles are distributed as follows: Biology 14; Applied Science 59; Chemistry 7; Medicine 40; Air Transportation 40; Radio 9. Thus in the same publications, covering a slightly greater time interval, Geology appears for mention in *three* articles!

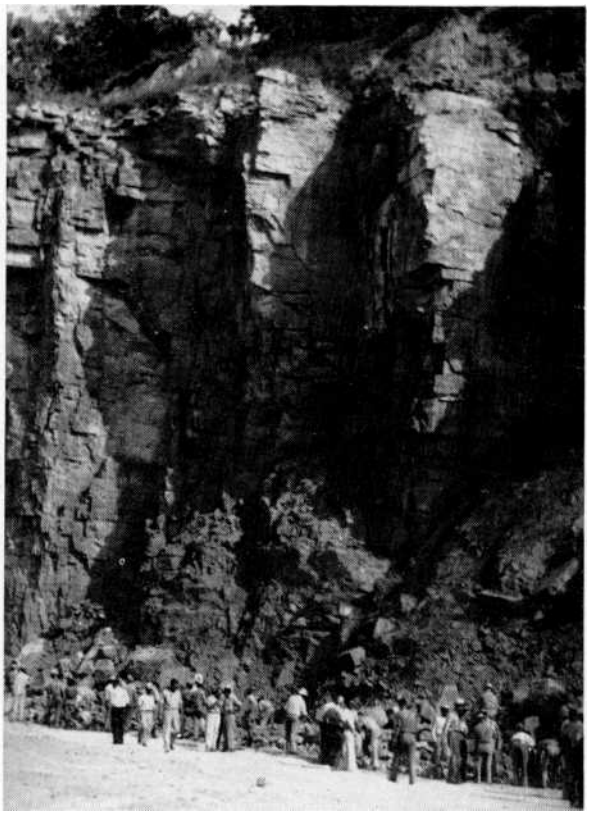
The many admitted imperfections in surveys of this nature should be kept in mind. However, the feeble showing of Geology in semipopular scientific print cannot readily escape notice. It does not seem logical that editorial supervision, alone, could be solely responsible for such a one-sided showing. It does suggest, of course, that geological lore cannot hold out to John Doe the possibilities of immunity from his aches and pains that medical lore will do, and that fact makes fair prophecy of what John Doe will wish to read. And then, there are other reasons, some of them most ordinary. Geology, like astronomy, deals with spacial relationships. The geologist goes places, and from those places he does not write back to the home newspaper. The inquiring reporter does not find it convenient to have a year off, now and then, in order to go to Venezuela with a petroleum geologist.

In certain communities—for example, the oil fields—the picture is entirely different. It is a picture of everyday life, however, not the reflection of what may be observed on library shelves. Several summers ago it was my experience to be in a community in Oklahoma where the discovery of oil in a potential new field was a matter of daily expectation. I remember my impressions as I read the newspapers during those days. The language of the reporter and the editorial writer was the language of the promoter, the driller and the geologist. I could have believed without effort that I had an oil journal in hand. The experience serves to recall a cartoon which was published in an oil-fields newspaper a good many years ago. A visitor is asking some school urchins what the fundamental branches of learning are in that community. The answer, in chorus from the youngsters is "Readin', writin', and *Geoilogy!"*

In places where life is largely out-of-doors, Geology practically

becomes self-taught. It has seemed to grow, as if by intuition, both on man and with him. Where the life of the nomad was the life of many men, branches of science were desert-born. Other great philosophies unfolded in the mind of man. Religions came. Gods came into being, populating with terrifying might and grandeur the heavens above, the lands beneath, and the plutonic depths. But even in minds more inclined to worship than to explore, perchance, the mastery of orderly thought took over. The heavens were considered, diagrams were drawn in the sand. Science was struggling for expression.

Greek philosophy which succeeded Grecian mythology contained



The towering rock wall, above the group of geologists at its base, symbolizes the magnitude of the task confronting the scientists who attempt to analyze the secrets of the rocks. The rock itself, formed by the slow accumulation and consolidation of sediments through centuries, affords by its fragments, and contents of minerals and fossils, the clues to the interpretation of its past. Photo by the author.

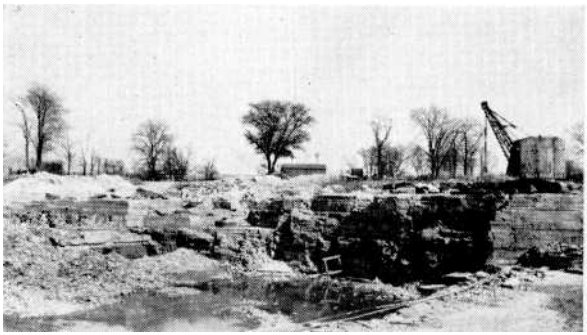
many germs of scientific appreciation and attained a measure which, from the perspective of 1941, is difficult to appraise fairly without exhaustive attention. Without derogation, therefore, it still is most interesting to note that commanding Greek thinkers could be less observant than a Huckleberry Finn in respect to their natural surroundings. They made observations but carried inferences too far. Some, like Aristotle, noted the winds blowing over the hills and transferred them to the under-ground to make them the cause of earthquakes. Volcanoes ceased to be the explosive breathings of buried gods but were due to the ignition of sulphur by the subterranean winds; and when floods subsided and the rivers in drought were all but entirely dry, the idea was that their waters had mingled with those of a deeply buried sea.

In their observations of changes wrought by streams—usually included in the introductory studies of elementary geology—and even in the scenery of shifting shorelines the Greek inquirers were more successful. Herodotus was able to see that even by its floods the Nile was enriching its Egyptian valley. Aristotle bore witness that the Black Sea was slowly yielding its domain to the deltas which were growing into it. Buried shells, found inland, in some cases on mountains, assured several other students that land and sea had traded positions.

From the curiosity and controversy which arose about these buried shells, these fossils, Geology eventually was to be led to its throne. But after the days of the Greek and Roman philosophers, long centuries passed before there was any great revival of interest in these "petrifactions," these "images in stone." When the discussion once again was started, however, it was to continue for about 250 years before anything like agreement concerning their nature was reached. And to bring about agreement, leaders had to arise who would convince their fellows with a natural and obvious interpretation of the fossils.

Among the leaders was Leonardo da Vinci doing engineering work in northern Italy about the end of the 15th century. He had to combat the ideas that fossils were formed by the creative influence of the stars, that they arose from a plastic force in the earth, that they were the plain works of the devil. It is among the uncounted blessings of man, perchance, that he is remembered best today on account of *Mona Lisa* and *The Last Supper* than for all of his scientific knowledge. It is said that had he known of gasolene he would have completed his mechanics of aviation, and that he knew of a way of remaining for long time under water. This he refused to tell because of "the evil nature of man." But his chroniclers have been able to

state that he was architect, engineer, mathematician, mechanician, musician, painter, sculptor and natural philosopher. More easily by him than by the majority of men could the evidence be accepted that the fossils from the mountains were the altered remains of organisms which once lived in the sea. He was the scientific Moses who walked up that mountain, alone. His ascent, however, was prophetic. The van presently was to follow.



A small rock quarry near Burlington, Wisconsin. Rocks very similar to these underlie much of eastern Wisconsin and northern Illinois. They conceal still older rocks and, elsewhere, are covered by younger sedimentary rocks. They indicate the former presence of extensive seas of salt water which occupied the interior of the continent from the Arctic regions to the Gulf of Mexico. Photo by the author.

There are heroic names among those in the vanguard. There were no geologists because Geology as a profession was not recognized. As an avocation it was becoming known. But there was an anatomist like Steno and a preacher like Whiston. There were Hutton and Lister among the physicians; there was Hooke a physicist, and Smith, an engineer; a geologist and a botanist, the duo Brongniart, father and son; Playfair, the mathematician; soldiers and naturalists like Lamarck and Murchison; and men of wealth, leisure and scientific passion like Cuvier, Lyell and Charles Darwin.

The above roll call summons to notice men whose lives spanned the years from about the middle of the 17th century to late in the 19th century when Charles Darwin died. To none of them, however, was the name "geologist" attached during their lifetime, with the exception, possibly, of the senior Brongniart and his title was largely in the academic sense. Practically all of the roll, however, has been mentioned by Geikie, the English geologist and author, who selected them for his volume, *The Founders of Geology.*

Long before the death of Charles Darwin, the honor list of Amer-

icans was growing. Those whose names now would be included in it, probably had no such idea. But in the national economy, fortunately for the science, the youthful States of the Union had their appointed state geologists. These men were known professionally as geologists and by them and their assistants the beginnings of the science with its national and institutional backing were inaugurated. In their ranks, however, were and are many of the self-made men whose boyish love for collections of minerals and fossils and whose love for study have placed them with the leaders in the science in America.

To attempt to illustrate, however, the established growth of the science, one or more instances furnished by the lives of the founders may assist. Two significant names appear—James Hutton and William Smith. Hutton was a Scotchman trained for medicine, but he retired from practice to take up the life of a farmer. Hutton fairly established modern Geology by emphasizing two great principles. One was that fossil-bearing rocks, after slow elevation by warps and uplifts and by being made into a land mass, were subjected to chemical decay and mechanical erosion. After ages of this attack, they slowly could be submerged again and buried by their own debris. Then, if the uplift were repeated, an ancient and worn-down landscape could appear buried under the sedimentary rocks of later age. The whole mass, now uplifted, would be passing through the cycle of destruction again before the eyes of the one who discovered the lost world of the earlier cycle. Hutton was so impressed with the force of this discovery that he phrased an utterance which has become classic in geological literature. He found that in the economy of nature there seemed to be "no vestige of a beginning—no prospect of an end"

Along with this he drew the conclusion that rivers did not find their valleys ready-made, or established by the collapse of caverns, but that they carved out their own valleys. In these ways he kept on reducing the interpretations of landscape aspects to conform with processes known by observation. In this he became one of the chief exponents of the principle of uniformitarianism which is the idea that processes seen today in operation have been consistent in that operation back into and through past ages. Thus in the lively debates of those days, Hutton made it necessary for those who would agree with him, and also for those who did not care to, to increase tremendously all previous guesses as to the age of the earth.

William Smith built Geology by a different mode entirely. Smith had none of the liking for conversation and for writing that Hutton had. Perhaps this has been fortunate, because Hutton was not easy to understand either through his speech or his writing. But Smith had a medium of expression which is indispensable for the geologist.

He made maps. And today, no professional training in Geology is complete without the development of ability to make maps—topographic and geologic. Smith, as an engineer, was developing then, perhaps unconsciously, a modal system which, in effect, is followed quite closely by geologists today. He was a thorough-going systematist not only in the acquisition of fossils and minerals by his collecting hobby, but also in the accumulation of data about them. He traced the layer-like succession of the rocks in their cliff and ditch exposures and arranged his collections to coincide with the position of the strata in which they were found. This was an entirely different method from that followed by most of his contemporaries whose specimens lay in helter-skelter disarray in the "cabinets of the curious."

His personal memoranda about the rock succession in the south and west of England became so voluminous that he found it convenient to devise a short-hand "key" to the rock relationships. He made his key diagrammatic so that the use of a "legend" for his geological maps and a "table of formations" for his geological notes became established.

Over as wide an area as possible in the British Isles, Smith followed the rock exposures establishing them in proper stratigraphic position by their "organized fossils." The terrane over which they spread could easily be indicated by coloring their extent on a map, at the time using the same color on the map as that borne by the rock in the field. Thus utilizing his ingenious methods Smith continued for at least 20 years acquiring and entering information about the sedimentary rocks of southwestern England, their extent, thickness, relations to other rocks, and mineral and fossil contents. When Smith became acquainted with other kindred spirits the knowledge he possessed seemed most desirable. Smith was willing to share it. Consequently his "table of English strata." first given out by dictation, was distributed freely in 1799 to those scientists who had an interest in Geology. In a few years the great significance of his method of identifying and dating rocks became fully appreciated and his scientific world was well prepared for the publication of his *Geological Map of England and Wales, with a part of Scotland,* which came in 1815. This and his other county geological maps did even more, possibly, to establish his fame as the "Father of English Geology" than did his discovery of the fossil sequence in the rocks.

It might become tiring to try to establish a claim for fatherhood of American Geology. If one wishes to try, he may turn to the pages of Merril's *Contributions to the History of American Geology,* or to Mather and Mason's *Source Book in Geology* for worthy nominations. The claim has been made in this article that Geology owes much of

its growth to the scientific contributions made by non-geological observers. It may seem that some support for this claim has been pointed out in preceding sketches of inspiring men. William Smith, called by others, the "Father of English Geology," called himself a "mineral engineer."

Another illuminative instance of the growth of Geology through contributions by non-geological observers may be selected, it is thought, from the very annals of the Chicago Academy of Sciences. Dr. Edmund Andrews, a professor of surgery, not of Geology, president of the Academy in 1869-70, furnishes the illustration. Evidently he was one of the first amateur observers in geology to note that the waves and currents of Lake Michigan, then with its shores largely unprotected, were potent agents of erosion and transportation. He noted also that the transportation by the lake's longshore currents was southward. Professor T. C. Chamberlin, another past-president of the Academy, and Dr. I. A. Lapham of Wisconsin, also were noting the same facts at other points along the west shore of the lake. Dr. Andrews noted further that certain piers near the mouth of the Chicago River were checking effectively, each year, a portion of the sand which was being carried to help build the Indiana dunes. He reasoned that if the cubic yardage of the sand now at the south end of the lake were divided by the cubic yardage of the sand seen to be stopped each year by the piers, the number of years it has taken to supply the dunes country with sand could be estimated.

The entire story of Dr. Andrews' ideas is told in an excerpt from the *Transactions of the Chicago Academy of Sciences*, Vol. II, published in 1870. The appeal in the pages of this account is not necessarily in the degree of geological and scientific accuracy, but in the boldness of his attack, the patience of his procedure and in the wealth of incidental detail which resulted in an account of the geological history of Lake Michigan, and its predecessor, Lake Chicago. This account is not uninteresting reading and the way it runs is not wholly out of step with more modern interpretations. Not altogether uninspiring also is the history of the study which brings out that if it required 20 years for Smith to secure his information about England, in like manner it required 12 years for Andrews to become satisfied with the amount of data he had secured.

Insistence that geological phenomena may be interpreted with fair success by the non-professional observer has been so persistent in the pages of this article that possibly the idea will become wearisome. But the intention has been to point out that any man or woman, if choice is made to be observant, can be self-elevated to the ranks of

scientific observers and thinkers. That, frankly, is the motive behind the choice of a hackneyed title, such as "Geology and Man." How good one may he while in these ranks is a problem faced equally both by professional and non-professional devotees of science.

One who has been studying Geology for 20 years or more may justly feel that full emphasis is now placed on precise and quantitative researches. The same individual will feel immensely satisfied for that reason, because it does not take 20 years for a humble geologist to learn that other scientists find it rather hard to keep from looking somewhat askance at the "probabilities" in Geology. But the echo of titles like "measurement of geologic time," "the effects of erosion on the size, shape and roundness of rock fragments," or "the theory of ground-water motion" all serve to bring a decided mental uplift to the geologist who wishes his science to savor of the same precision which rules in astronomy, chemistry, mathematics and physics.

Even while these trends clearly may be recognized, a substantial and stubborn reality still confronts the geologist. He and his fellows are striving to interpret correctly earth phenomena and to decipher past events of earth history. An assignment of magnitude too great to be measured or defined rests on a physical base of world dimensions. Precise study of the nature indicated in the titles quoted above reflects the details of measurements and experiments gained by field and laboratory attack. Details of the kind gained by accurate observation and description in the field are fully as necessary. Field studies like those of the first observers who sought a reasonable explanation for the aspects of landscape and rocks are still imperative. Areal studies have to continue. Field investigations in the same localities and concentrated on the same evidence which may have been examined 100 years ago are justifiable. The fundamentals established by the facts first considered are not changing essentially, but new places of vantage from which to view the facts are changing daily. The sole occupation of geologists employed by federal and state geological surveys, oil companies, railroad companies, mining companies, contractors and promoters is the collecting of geological data. The activities of these scientists result in presenting to themselves and to the academic geologist, let us say, new angles to old problems. Nature has laid its handiwork at the feet of every man. The way remains open for any willing man to enjoy the same inspiration of exploration and of intellectual conquest which Hutton, Smith and Andrews found.

Edmund Andrews

Edmund Andrews was born on April 4, 1892 and died October 16, 1941. He was a graduate of Yale University and of Rush Medical College. A member of many scientific societies, he was for several years on the faculty of Northwestern University Medical School, then Associate Professor of Surgery at the University of Illinois and for some years prior to his removal from Chicago in 1936, Professor of Surgery at the School of Medicine of the University of Chicago. As Vice-President of the Chicago Academy of Sciences from 1928 to 1937, he made valuable contributions to its usefulness and was actively interested in its expansion and development.

Doctor Andrews carried on with distinction the fine traditions of a Chicago family long eminent for its contributions to surgery and to science. His grandfather, Edmund Andrews was a founder of the Academy and for many years Professor of Surgery in what is now Northwestern University Medical School. His father, E. Wyllys Andrews, was an active member of the Academy and like his father, Professor of Surgery at Northwestern.

Edmund Andrews had a forceful, fearless character and was noted for his independence and for the originality of his ideas. His investigations and writings covered a wide range of subjects, including medical history, disturbances in water-balance in shock, improvements in surgical technique and experiments on stone formation in the biliary tract. At the time of his death, a Tahitian-English Dictionary in the compilation of which he and Mrs. Andrews had collaborated while vacationing in the South Seas, was being made ready for publication by the Academy.

His broad cultural interests, keen sense of humor and *joie de vivre* made of him a delightful companion who will be greatly missed by his many friends. He is survived by his widow and a son, E. Wyllys Andrews, whose career as an anthropologist bids fair to be as distinguished in that field as were those of his forebears in the field of surgery.

The officers of the Academy extend to Mrs. Andrews and "Bill" their most sincere sympathy.

NATHAN SMITH DAVIS, III

The Cowles Botanical Society

On December 18 a meeting attended by thirty-four leading botanists of Chicago and vicinity resulted in the formation of the Cowles Botanical Society. Invitations to the inaugural meeting were issued by the Chicago Academy of Sciences and several botanists who have been tentatively planning such an organization for some time. In response to this long-felt need, those who have been thinking actively along the lines of better understanding and cooperation between students of plants and local institutions have pooled their ideas and aims in the new organization.

The society takes its name from one of the greatest of Chicago botanists, Henry Chandler Cowles. One of the world's leading plant ecologists, Dr. Cowles was an outstanding teacher whose inspirational influence upon his students will extend for generations, and whose genial personality and exhaustive knowledge has set a standard for all his fellow scientists. There is no finer example of scholar, teacher and friend and it is with deep respect that the members of the society wish to honor his memory.

The objectives of the organization are to promote better contacts between persons interested in botany, to attack botanical problems with better cooperation and collaboration, to utilize the botanical resources of the Chicago Region to a greater extent, and to provide renewed inspiration and stimulation in botanical studies.

It is the aim of the organizers to provide for a mutual exchange of information and ideas at each meeting, so that the tremendous amount of specialized knowledge represented in the membership may become available and assist in the work of others. it is believed that much collaboration will result from a greater knowledge of the individual capabilities and specialties of the membership and will so broaden the horizon of all.

Monthly meetings will be held at the Chicago Academy of Sciences on the third Tuesday of each month. At these meetings speakers will present lectures and papers. In order to develop an understanding of the botanical facilities and resources of the Middle West and to stimulate a greater utilization of them, the program committee is planning to present leading speakers from each of the universities, museums, libraries, arboreta, municipalities, and other institutions in a correlated series that will graphically portray the contribution that each is best able to make to a greater development of botanical interests in this region.

Also being planned for the future are several excursions to points of interest. These excursions will be correlated as far as possible with

(Continued on page 127)

MUSEUM ACTIVITIES

Winter Lecture Series

The annual winter series of Sunday Afternoon Lectures will begin Sunday, January 11, 1942.

The autumn series, from November 2 to December 14, was, as usual, well attended. Several of the lectures were given twice in order to accommodate the crowds. On occasions of unusually large attendance there has been confusion and inconvenience to members of the Academy and other visitors. In the hope of eliminating, or at least reducing, such difficulties, tickets will be used for admission to these lectures in the future. As in the past, however, *there will be no charge.*

Members of the Academy may reserve tickets by telephone or in writing at any time during the week preceding each lecture, and their tickets will be held for them at the museum until 3 o'clock on the day of the lecture. All seats in the reserved section not claimed by 3:00 P.M. will be made available to the general public.

Non-members may obtain tickets by calling in person at the Museum office between 1 and 3 P.M. on the day of the lecture.

The lectures in the Winter Series are as follows:

Jan. 11: **Story-book Snakes and Snake Stories,** Dr. Howard K. Gloyd, Director, The Chicago Academy of Sciences.

A vast folk lore—chiefly of misconceptions— has grown up about snakes: fabulous stories brought home by early travelers, superstitions of unknown origin, and fallacious beliefs having some foundation in fact. Dr. Gloyd will describe some of these misconceptions, tracing their origins when possible, and presenting the facts which are definitely known. Illustrations from some of the earliest books on zoology and from modern sources.

Jan. 18: **Antarctica: the Last Continent,** David Davis, Chicago.

Mr. Davis, a Chicago lawyer, has made the study of Antarctica an avocation for many years and is regarded by students of the Antarctic as an authority on the subject. His address covers a wide range of topics concerning Antarctica: its unusual geography, history, animal life, and its commercial and scientific importance.

Jan. 25: **A Naturalist's Glimpse of Peru,** Karl P. Schmidt, Field Museum of Natural History.

Mr. Schmidt, Chief Curator of Zoology at the Field Museum of Natural History, has taken part in scientific expeditions to many parts of the world. In his lecture he tells of his experiences on a recent expedition to Peru.

Feb. 1: **India and the Vale of Kashmir,** Edith Bane, Pittsburgh, Pennsylvania.

Edith Bane is a well-known lecturer and world traveler. She is an expert photographer and finds her way to remote places where the average traveler does not venture. We will see color motion pictures of the vast panorama of beauty and an ageless civilization that are India.

Feb. 8: **This Flowering Earth,** John Y. Beaty, Arlington Heights, Illinois.

Mr. Beaty is an author, traveler, and lecturer, whose interpretations of natural history for the layman are exceptional. In "This Flowering Earth" he presents over 100 natural color slides—photographs made in all parts of the United States—of rare and unusual blossoms.

Feb. 15: **The Future of Television,** Dr. Frank Q. Brown, Chicago Technical College.

Television is a technical advancement which has come a long way since the early experiments but one which still has a hard path ahead before it will be readily available to all. Dr. Brown will point out some of the difficulties which must be overcome. Motion pictures will take the audience to the studios of the National Broadcasting Company in New York City and show just how pictures are televised.

Feb. 22: **From the Tetons to the Columbian Ice Fields,** Dr. Verne O. Graham, Vice-President, Chicago Academy of Sciences.

Dr. Graham, a botanist well-known to nature-lovers of the Chicago Region, is Vice-president and Honorary Curator of Botany of the Chicago Academy of Sciences. Last summer he traveled to the northwest through the Tetons and the Canadian Rockies. His kodachrome pictures of this majestic country enable him to share this scenic treat with others.

March 1: **Rediscovering Our Great North Woods,** Sam Campbell, The Philosopher of the Forest, Three Lakes, Wisconsin.

For years this Naturalist and Philosopher has been famous for his remarkable work in gaining the friendship of wild creatures at his "Sanctuary of Wegimind," in northern Wisconsin. Mr. Campbell's present lecture and films show the finding of a new sanctuary—deeper in the wilderness, unfolding new adventures with amusing and amazing animal friends.

March 8: **The Tropical Rain Forest,** Dr. Harry L. Andrews, Herzl Junior College, Chicago.

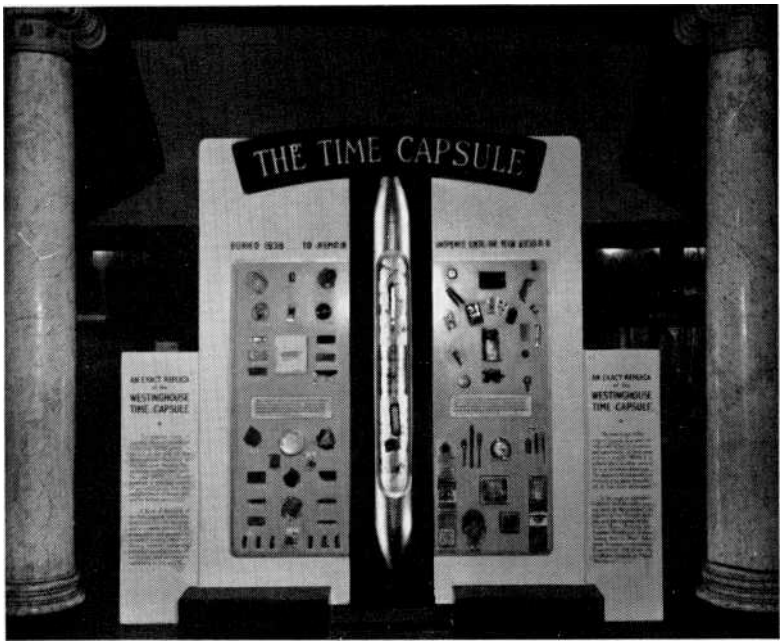
Dr. Andrews last summer made an extensive trip through Panama, Honduras, Guatemala, and Eastern Costa Rica. A record of his journey on color motion picture film shows the tropical rain forest, or jungle—its plants and animals and particularly the relationships which exist between the plants and animals in this fascinating habitat.

March 15: **West Meets East—A Stirring Contrast,** Dr. Louis J. Tint, Chicago.

For many years Dr. Tint has made a practice of taking extensive tours to all parts of the country to photograph the beauties of nature in natural color. This year we are to see the grand spectacle of the canyon of the Yellowstone, the majestic mountains of the Grand Canyon of Arizona — contrasted with the rolling hills of New England.

The Academy Participates in Recreation Conference

The Chicago Academy of Sciences had an exhibit in connection with the Seventh Annual Chicago Recreation Conference at the Hotel Sherman, November 18. Sponsored by the Chicago Recreation Commission, the conference had as its theme "Recreation in a Period of Social Change." Drs. Williams and Hatfield were at the booth to greet visitors and describe the work of the Academy. As a part of the exhibit, a short motion picture from the Academy's film library, shown on a continuous projector, attracted a great deal of interest.



Special Exhibits

TIME CAPSULE

From October 12 to December 15, a replica of the Westinghouse Time Capsule was on display in the lobby of the Academy. The original capsule, an 800-pound "letter to the future," contains a record of our civilization printed on microfilm and forty articles of common use. The travelling display is a faithful reproduction of the original. A replica of the Capsule, with a cutaway section to reveal the inside, occupies the center of the exhibit. On either side are articles typical of the contents.

Buried in a 50-foot well at the site of the Westinghouse Exhibit at the New York World's Fair in 1940, the cupaloy envelope is sealed within two thicknesses of steel pipe and a layer of resistant plastic. Its inscription directs the Time Capsule to the people of 6939 A. D., 5000 years from the date of its sealing.

Objects preserved in the Time Capsule—coins, a woman's hat, an electric lamp, fabrics, playing cards, eye glasses, and other articles in common use in 1939—are sealed within a Pyrex glass envelope from which the air was exhausted.

Books, magazines, newspapers, catalogues, and other graphic material were reproduced on microfilm composing more than 22,000 pages of text, 1000 pictures, or more than 10,000,000 words.

A book of record, printed on permanent paper and containing full directions for several means of finding the Time Capsule, has been distributed to libraries and museums throughout the world.

DEFENSE MATERIALS

An exhibit of strategic, critical, and surveillance materials is now on display in the Academy lobby. These three categories have been set up by the Army and Navy Munitions Board as a basis for the control of raw materials necessary for defense.

Most of the mineral specimens were

loaned for the exhibit by the U. S. Bureau of Mines and samples of many other types of materials have been supplied by various manufacturing concerns in Chicago. This very timely exhibit is proving of great interest to museum visitors.

Academy Aids Y. M. C. A. Camp Project

The Chicago Y. M. C. A. last year obtained a tract of land in the Palos Park area which has been made into a camp for use by members of the organization. The site of the camp includes the only local colony of a very interesting mound-building ant, *Formica ulkei* (see article by A. S. Windsor, *Chicago Naturalist,* vol. 2, 1939, no. 3). There was some thought of destroying these fascinating mounds but through the activities of the Secretary of the Academy, Alton S. Windsor, it has been decided to protect and make use of them as an educational feature of the camping program. As a result of this initial contact a meeting of the Y. M. C. A. camp leaders was arranged at the Englewood Department on Tuesday evening, December 9, for the purpose of acquainting these men with the educational and recreational possibilities of the natural history resources of the camp area, and suggesting ways of making the best possible use of them. The meeting was arranged by Merril Enyeart and Dr. E. C. Williams, the latter acting as chairman. The speakers from the Academy were Alton S. Windsor, Secretary; Dr. Donald M. Hatfield, Curator of Mammals; Dr. John R. Ball, Honorary Curator of Geology and Dr. Verne O. Graham, Vice-president and Honorary Curator of Botany. As a result of this meeting, further cooperation between the Academy and the Y. M. C. A. is being planned in the hope of making the best possible use of this opportunity to bring the story of nature to thousands of young men.

Midwest Museum Conference

At the 14th annual meeting of the Midwest Conference of the American Association of Museums held in Fort Wayne, Indiana, October 16-18, 1941, Dr. E. C. Williams, Jr., Assistant to the Director of the Chicago Academy of Sciences was elected vice-president for Illinois. The three-day conference, attended by museum people from Ohio, Indiana, Michigan, Illinois, and Wisconsin, was characterized by a keen spirit of cooperation. Representatives of all types of museums—science, art, and history—exhanged mutually helpful ideas on methods of exhibition, educational programs, public relations, and many other topics.

Naturalist Wins Award

The Chicago Naturalist received the Honorable Mention Award in the Association Division of a contest recently conducted by the Industrial Editors Association of Chicago. Represented in the contest were magazines of industrial organizations and non-profit associations, both local and national in scope. The members of the staff feel pride in this accomplishment and hope to maintain the high standards which have been set by the *Naturalist* in its first four volumes.

Distinguished Visitors

Recent visitors to the museum include Mrs. William Lloyd Garrison, III, curator-in-chief of the Brooklyn Children's Museum; Miss Mary Brady, director of the Harmon Foundation, New York Mr. M. E. Lombardi, vice-president of the California Academy of Sciences, San Francisco; and Dr. William A. Riley, head of the Division of Entomology, University of Minnesota.

NOTE: The index to Volume 4 of the *Naturalist* will be printed separately and mailed with the next issue.

A MANUAL OF AQUATIC PLANTS

By Norman C. Fassett

McGraw-Hill Book Co., Inc., New York, 1940. vii., 382 pages, more than half of which are devoted to line drawings. $4.00.

There can be no doubt that Professor Fassett's book is thorough and scholarly albeit it is very unorthodox in point of method in organization. With complete assurance he abandons keys based upon reproductive structures in favor of gross leaf, stem, and mass characters. All of the aquatic plants lose their time-honored caste as they are dropped into seventeen categories, the first seven of which are broken down further in the succeeding thirty-one pages of the general key. Bladders, sheaths, stipules, margins and such cut across the whole accepted lineage to make a key that can be used whether or not the plant is in flower and fruit. This is accompanied by excellent drawings illustrating basic structures and the plants on which they are readily demonstrable. Like other keys, the lines end at length with the name of the plant or plants sought and a reference page.

Part two is the descriptive treatment of the plants thus keyed. The algae are borderline plants, macroscopically speaking, and get brief treatment. The higher plants receive meticulous definition both in key and illustration. Habit sketches show the plant form and inclination. There is no hesitation in detaching any structure from the whole and giving it prominence in picture or description if such detail is helpful in identification. If, for instance, venation helps to distinguish two varieties, it is carefully depicted. A few figures are borrowed from authorities in their special fields; the grasses are from Hitchcock where they are already done so well that drawing them again would constitute societal waste. The drawings are scientifically accurate and yet they are very pleasant. It appears that line drawings cannot be supplanted in this type of work, simply because they can emphasize definite characters without losing the truth. For those who identify plants by comparing them with illustrations—and for those who don't admit they do— here is the answer.

When followed through, the keys within the family constitute a complete description of the species or its divisions. Hence, there is no need for a final explanatory paragraph. Nomenclature follows Gray or Britton and Brown unless supplanted by other authorities when synonyms are indicated. Important references follow controversial groups, an aid to those interested in taxonomic discussion. The book ends with an excellent section on wildlife and its relation to water plants, again with abundant references.

—Anna Pedersen Kummer

THE ROAD OF A NATURALIST

By Donald Culross Peattie

Illustrated with woodcuts by Paul Landacre. Houghton Mifflin Co., Boston, 1941. 315 pages, illustrated. $3.00.

In the delightful style which characterizes his previous books, Donald Culross Peattie tells the story of his life. It is not a simple chronological account but one which opens with a recent trip to the Mohave Desert and, through memories brought up by contact with nature, gives one glimpses of the author's life. His early interest in nature

gradually unfolds and we see how he came to do that which he wanted to do more than all else—study nature and interpret it for his fellow man. That he is a successful interpreter is more than amply shown by this book. Interspersed between episodes in his life, Peattie presents a number of charming essays which deal with relevant material; for instance, the story of the first white settlers to cross Death Valley and the life of Robert Kennicott, first Director of The Chicago Academy of Sciences.

For the lover of nature who would vicariously enjoy the beauties of our country, who would like a guide to the paths open to those willing to walk slowly and notice life about them, this book is certainly on the "required list."

—Eliot C. Williams, Jr.

AMERICAN WILD LIFE

By Works Projects Administration, New York

Wise and Company, New York, 1940. xiv, 749 pages, 333 photographs, 6 in color.

The compilation of a comprehensive vertebrate natural history is a task which requires either many years of one worker's time or the efforts of several collaborators, each supplying a portion of the complete work. The latter plan has been followed here and, as might be expected, the whole is not too homogeneous insofar as style and completeness are concerned.

The five groups of vertebrates are considered in the following order — mammals, fishes, reptiles, amphibians, and birds. I can find no logical explanation for this deviation from phylogenetic order, nor for the fact that the mammals are arranged in an order directly opposite to that commonly accepted today; i. e., from the primitive to the more advanced. Unfortunately, the section on mammals does not compare at all favorably with other parts of the book. Such errors as reference to the chipmunk as a rock squirrel, and captioning an excellent photograph of a golden-mantled ground squirrel "Western-chipmunk *(Eutamias quadrivittatus)*" tend to put the reader off.

Despite these rather obvious errors, however, the book is one that many people will find valuable as a reference work. There is a pronouncing index of twelve pages which should prove useful.

—Donald M. Hatfield

THE SOILS THAT SUPPORT US

An Introduction to the Study of Soils and Their Use by Men.

By Charles E. Kellogg

The Macmillan Co., New York, 1941, x, 370 pages, 80 figures. $3.50.

Soil science is one which is of direct concern to all of us. The ultimate source of all our food materials is in the green plants which have, for successful production, certain soil requirements. This volume sets down the basic principles of soil science in a way that is understandable to the layman and also very useful to the student and professional worker.

A brief history of the development of soil science leads into a discusssion of the composition of soils and is followed by a treatment of the relationships between plants and the soil. The structure of soils and the kinds of soils to be found in different parts of the world—grasslands, deserts, temperate forests, etc.—make up the subject matter for the largest portion of the book. The final chapters deal with the use of soils by man, how soils should be used, and how they are often mistreated. Throughout the book excellent photographs and diagrams are very effectively used. Extensive appendices on soil classification, literature, and a glossary add much to the value of the book.

—Eliot C. Williams, Jr.

FIELD BOOK OF SNAKES OF THE UNITED STATES AND CANADA

By Karl P. Schmidt and
D. Dwight Davis

G. P. Putnam's Sons, New York, 1941. xiii, 365 pages, 103 text figures, frontispiece in color, 34 plates (3 colored), index. $3.50.

The most recent of the well-known series of Putnam's field books, this work is the most up-to-date and authoritative systematic account of North American snakes.

The introductory section, comprising pages 1 to 62, concisely discusses the place of snakes in nature, folklore of snakes, history of the study of snakes in the United States, definition and classification, external characters and coloration, poison apparatus and treatment of snake bite, habits and behavior, collection, preservation, and study of snakes.

The systematic section, making up most of the remainder of the book, is preceded by a key to genera in which the important characters are illustrated by line drawings. Keys to species and subspecies are given for some of the more difficult genera, such keys being dispensed with where the number of forms is few and accurate identification is made possible by means of diagnostic paragraphs, drawings, and other considerations.

In addition to summarizing what is known about the natural history of the various species of snakes, the authors have taken pains to reveal many of the gaps in such knowledge so that the book may serve as a guide to useful observations that should be made. A section headed "References" (p. 313-322) lists important general works for North America as a whole, for Canada, for western North America, and for each of the several states. Important papers are also cited in appropriate places throughout the body of the work.

The illustrations, in general, are excellent. The photographs, chiefly by the junior author, manifest great care in preparation, clearly show such diagnostic characters as form and pattern, and supplement the keys and diagnoses in identification. The color plates, with one exception, are well printed and add much to the attractiveness of the volume. Unfortunately many of the shaded drawings in the text, undoubtedly well executed by the artist, suffer noticeably in the process of reproduction. This is in part due to the nature of the paper which seems not well chosen for a book of this kind.

Criticisms involving minor technical details will not be indulged in here (if the present reviewer were to compile such a list it would be brief), but the unfortunate omission of the genus *Sonora* from the key to genera should not be passed over. Considering the limitations imposed by a page size of 4 x 6¾ inches, the authors and publishers have made a book that will prove to be of great usefulness to all naturalists.

—H. K. Gloyd

A KEY TO THE REPTILES AND AMPHIBIANS OF ILLINOIS

By Fred R. Cagle

Contribution No. 5, Museum of Natural and Social Sciences, Southern Illinois Normal University, Carbondale, 1941. iv, 32 pages, 66 figures, 3 plates. College Book Store, Carbondale, Ill. $0.25.

A need for a modern list of the amphibians and reptiles of Illinois, with a simple and reliable means of identifying them, has existed for many years. The present work, in response to this need, promises to serve its purpose admirably. One hundred and five species and subspecies are included, of which seven have not yet been recorded within the state boundaries but are logically to be expected.

Illustrated by pen and ink drawings and published by the planograph process, the key is in the usual dichotomous form and includes brief, general statements of the geographic distribution of each form within the state. Technical terms are kept relatively simple and are explained in a glossary. There is also a list of references to pertinent literature.

—H. K. Gloyd

The Museums of Britain and the War

(Continued from page 101)

From what has been said it follows that there is not much opportunity for research. For that plenty of books and specimens are essential, as well as a certain amount of leisure. The books and specimens have been scattered for their greater safety and any leisure time there may be is fully occupied by Civil Defense duties or other forms of war work nevertheless a certain amount of research is being done. Much of it has a more or less direct bearing on the war and consequently cannot he discussed, but some is still pure research of no im mediate practical application, and some of it, which arises from Public enquiries, may have greater importance than is apparent from the questions asked.

In conclusion it may be said that dispersal over a wide area is the best method of preservation of specimens and books ; if whole collections can be removed, even though they make many truck-loads, so much the better. Storage in vaults in the museum is not so satisfactory. A heavy bomb is apt to penetrate a vault before exploding, and water used for fire-fighting certainly drains there. As long as they are not too severely damaged exhibition galleries are kept open until closure is forced by circumstances, even then they are reopened with the least possible delay until the time comes when closure for the duration of the war can no longer be avoided. So long as the museums are open the attendances are very satisfactory ; when they are closed the postbag indicates the interest still taken in them by the public. The depleted staffs carry on cheerfully despite the difficulties they have to face, full of confidence that in the future their museums will play an important part in rebuilding and directing the cultural life of the nation.

(Continued from page 119)

lectures to be presented in advance. During the spring and summer, there will be trips to arboreta, parks, gardens, preserves, and the prairies and woodlands which still remain. In the winter, trips will be made to institutions where special arrangements can be made to see and become acquainted with the lesser known facilities that are available.

Dr. Verne O. Graham was elected President and Mrs. Charles E. Olmsted, Secretary. Membership is open to all botanists and interested persons. The next meeting will be on January 20 at 8:00 P.M. at the Academy.

Publications on Natural History For Sale by the Academy

MAMMALS

Mammals of the Chicago Region, *by Tappan Gregory* - - - $0.25

Mammals of the Great Smoky Mountains,
by E. V. Komarek and Roy Komarek - - - - - - - - - - - - - .25

Mammals of Illinois,
by W. L. Necker and D. M. Hatfield, 1941 - - - - - - - - - .25

BIRDS

Birds of the Chicago Region, *by E. R. Ford, C. C. Sanborn, and C. Blair Coursen, 1934* - - - - - - - - - - - - - - - .50

A Synopsis of the North American Birds of Prey,
by Maj. L. R. Wolfe - .25

REPTILES AND AMPHIBIANS

Reptiles and Amphibians of the Chicago Region,
by K. P. Schmidt and W. L. Necker, 1936 - - - - - - - - - - - .25

Records of Amphibians and Reptiles of the Chicago Region, 1935-8*; by W. L. Necker, 1939* - - - - - - - - - - - .10

Poisonous Snakes of Illinois, *by W. L. Necker, 1939* - - - - - - - .10

The Rattlesnakes, genera *Sistrurus and Crotalus*,
by H. K. Gloyd, 1940 - 2.50

BOTANY

Flora of the Chicago Region,
by H. S. Pepoon, bound in cloth - - - - - - - - - - - - - - - - 1.25

Mushrooms of the Chicago Region, *by V. O. Graham* - - - - - - .25

All Prices Include Postage

Publications on Geology, Paleontology, and Invertebrate Zoology, and others in the fields listed above, are also available. Ask for complete list of titles on the subjects of your special interest.

MEMBERSHIP

in

The Chicago Academy of Sciences

helps support

The Museum of Natural History, over 320,000 visitors annually

Public lectures throughout the fall and winter months

Extension work in cooperation with the schools and the Chicago Park District

Field studies of local flora and fauna and expeditions to other regions

Research by staff members

Publications, both technical and popular

Libraries, a children's library and a scientific library

Although the Academy is at present filling a definite place in the educational life of the Chicago Region, its resources are inadequate for the services it is potentially able to render. Those interested in advancing studies in the field of natural history are invited to help by supporting such activities through membership in the Academy.

PRIVILEGES OF MEMBERSHIP

All members of the Academy receive *The Chicago Naturalist* four times a year ... Special announcements of lectures and other activities ... Reserved seats for Academy lectures ... Access to the study collections ... Use of the scientific library and reading room ... Cordial assistance from members of the museum staff in connection with studies or special interests.

MEMBERSHIP FEES

Contributing, annually	$25	Life Membership	$100
Sustaining, annually	$10	Fellow	$500
Associate, annually	$3	Patron	$1000

THE CHICAGO NATURALIST

is now available to institutions such as libraries, schools, clubs, and comparable organizations at a subscription price of $1.50 per year.